SEQUENCE LISTING

<110> Davydova, Elena K.
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Gerdes, Svetlana Y.
Jendrisak, Jerome J.

<120> PREPARATION AND USE OF SINGLE-STRANDED TRANSCRIPTION SUBSTRATES FOR SYNTHESIS OF TRANSCRIPTION PRODUCTS CORRESPONDING TO TARGET SEQUENCES

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Ala Asp Lys Asn Lys Ser Val His Tyr Gln Ala Leu Thr Ala Asp Arg
            820                 825                 830

Glu Trp Val Arg Ser Arg Thr Gly Leu Gly Val Asn Pro Tyr Asp Thr
        835                 840                 845

Lys Ser Val Lys Phe Ala Gln Gln Val Ala Leu Glu Ala Lys Thr Val
    850                 855                 860

Ala Asp Ile Ala Asn Ala Leu Ala Ser Ala Tyr Pro Glu Leu Lys Val
865                 870                 875                 880

Ser His Ile Lys Val Thr Pro Leu Asp Ser Arg Leu Asn Ala Pro Ala
                885                 890                 895

Ala Glu Val Val Lys Ala Phe Arg Gln Gly Asn Arg Asp Val Ala Ser
            900                 905                 910

Ser Gln Pro Lys Ala Asp Ser Val Asn Gln Val Lys Glu Thr Pro Val
        915                 920                 925

Thr Lys Gln Glu Pro Val Thr Ser Thr Val Gln Thr Lys Thr Pro Val
    930                 935                 940

Ser Glu Ser Val Lys Thr Glu Pro Thr Thr Lys Glu Ser Ser Pro Gln
945                 950                 955                 960

Ala Ile Lys Glu Pro Val Asn Gln Ser Glu Lys Gln Asp Val Asn Leu
                965                 970                 975

Thr Asn Glu Asp Asn Ile Lys Gln Pro Thr Glu Ser Val Lys Glu Thr
            980                 985                 990

Glu Thr Ser Thr Lys Glu Ser Thr Val Thr Glu Glu Leu Lys Glu Gly
        995                1000                1005

Ile Asp Ala Val Tyr Pro Ser Leu Val Gly Thr Ala Asp Ser Lys Ala
   1010                1015                1020

Glu Gly Ile Lys Asn Tyr Phe Lys Leu Ser Phe Thr Leu Pro Glu Glu
1025                1030                1035                1040

Gln Lys Ser Arg Thr Val Gly Ser Glu Ala Pro Leu Lys Asp Val Ala
                1045                1050                1055

Gln Ala Leu Ser Ser Arg Ala Arg Tyr Glu Leu Phe Thr Glu Lys Glu
            1060                1065                1070

Thr Ala Asn Pro Ala Phe Asn Gly Glu Val Ile Lys Arg Tyr Lys Glu
        1075                1080                1085

Leu Met Glu His Gly Glu Gly Ile Ala Asp Ile Leu Arg Ser Arg Leu
   1090                1095                1100
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Ala Lys Phe Leu Asn Thr Lys Asp Val Gly Lys Arg Phe Ala Gln Gly
1105                1110                1115                1120

Thr Glu Ala Asn Arg Trp Val Gly Gly Lys Leu Leu Asn Ile Val Glu
                1125                1130                1135

Gln Asp Gly Asp Thr Phe Lys Tyr Asn Glu Gln Leu Leu Gln Thr Ala
            1140                1145                1150

Val Leu Ala Gly Leu Gln Trp Arg Leu Thr Ala Thr Ser Asn Thr Ala
        1155                1160                1165

Ile Lys Asp Ala Lys Asp Val Ala Ala Ile Thr Gly Ile Asp Gln Ala
    1170                1175                1180

Leu Leu Pro Glu Gly Leu Val Glu Gln Phe Asp Thr Gly Met Thr Leu
1185                1190                1195                1200

Thr Glu Ala Val Ser Ser Leu Ala Gln Lys Ile Glu Ser Tyr Trp Gly
                1205                1210                1215

Leu Ser Arg Asn Pro Asn Ala Pro Leu Gly Tyr Thr Lys Gly Ile Pro
            1220                1225                1230

Thr Ala Met Ala Ala Glu Ile Leu Ala Ala Phe Val Glu Ser Thr Asp
        1235                1240                1245

Val Val Glu Asn Ile Val Asp Met Ser Glu Ile Asp Pro Asp Asn Lys
    1250                1255                1260

Lys Thr Ile Gly Leu Tyr Thr Ile Thr Glu Leu Asp Ser Phe Asp Pro
1265                1270                1275                1280

Ile Asn Ser Phe Pro Thr Ala Ile Glu Glu Ala Val Leu Val Asn Pro
                1285                1290                1295

Thr Glu Lys Met Phe Phe Gly Asp Asp Ile Pro Pro Val Ala Asn Thr
            1300                1305                1310

Gln Leu Arg Asn Pro Ala Val Arg Asn Thr Pro Glu Gln Lys Ala Ala
        1315                1320                1325

Leu Lys Ala Glu Gln Ala Thr Glu Phe Tyr Val His Thr Pro Met Val
    1330                1335                1340

Gln Phe Tyr Glu Thr Leu Gly Lys Asp Arg Ile Leu Glu Leu Met Gly
1345                1350                1355                1360

Ala Gly Thr Leu Asn Lys Glu Leu Leu Asn Asp Asn His Ala Lys Ser
                1365                1370                1375

Leu Glu Gly Lys Asn Arg Ser Val Glu Asp Ser Tyr Asn Gln Leu Phe
            1380                1385                1390

Ser Val Ile Glu Gln Val Arg Ala Gln Ser Glu Asp Ile Ser Thr Val
        1395                1400                1405

Pro Ile His Tyr Ala Tyr Asn Met Thr Arg Val Gly Arg Met Gln Met
    1410                1415                1420

Leu Gly Lys Tyr Asn Pro Gln Ser Ala Lys Leu Val Arg Glu Ala Ile
```

1425 1430 1435 1440

Leu Pro Thr Lys Ala Thr Leu Asp Leu Ser Asn Gln Asn Asn Glu Asp
1445 1450 1455

Phe Ser Ala Phe Gln Leu Gly Leu Ala Gln Ala Leu Asp Ile Lys Val
1460 1465 1470

His Thr Met Thr Arg Glu Val Met Ser Asp Glu Leu Thr Lys Leu Leu
1475 1480 1485

Glu Gly Asn Leu Lys Pro Ala Ile Asp Met Met Val Glu Phe Asn Thr
1490 1495 1500

Thr Gly Ser Leu Pro Glu Asn Ala Val Asp Val Leu Asn Thr Ala Leu
1505 1510 1515 1520

Gly Asp Arg Lys Ser Phe Val Ala Leu Met Ala Leu Met Glu Tyr Ser
1525 1530 1535

Arg Tyr Leu Val Ala Glu Asp Lys Ser Ala Phe Val Thr Pro Leu Tyr
1540 1545 1550

Val Glu Ala Asp Gly Val Thr Asn Gly Pro Ile Asn Ala Met Met Leu
1555 1560 1565

Met Thr Gly Gly Leu Phe Thr Pro Asp Trp Ile Arg Asn Ile Ala Lys
1570 1575 1580

Gly Gly Leu Phe Ile Gly Ser Pro Asn Lys Thr Met Asn Glu His Arg
1585 1590 1595 1600

Ser Thr Ala Asp Asn Asn Asp Leu Tyr Gln Ala Ser Thr Asn Ala Leu
1605 1610 1615

Met Glu Ser Leu Gly Lys Leu Arg Ser Asn Tyr Ala Ser Asn Met Pro
1620 1625 1630

Ile Gln Ser Gln Ile Asp Ser Leu Leu Ser Leu Met Asp Leu Phe Leu
1635 1640 1645

Pro Asp Ile Asn Leu Gly Glu Asn Gly Ala Leu Glu Leu Lys Arg Gly
1650 1655 1660

Ile Ala Lys Asn Pro Leu Thr Ile Thr Ile Tyr Gly Ser Gly Ala Arg
1665 1670 1675 1680

Gly Ile Ala Gly Lys Leu Val Ser Ser Val Thr Asp Ala Ile Tyr Glu
1685 1690 1695

Arg Met Ser Asp Val Leu Lys Ala Arg Ala Lys Asp Pro Asn Ile Ser
1700 1705 1710

Ala Ala Met Ala Met Phe Gly Lys Gln Ala Ala Ser Glu Ala His Ala
1715 1720 1725

Glu Glu Leu Leu Ala Arg Phe Leu Lys Asp Met Glu Thr Leu Thr Ser
1730 1735 1740

Thr Val Pro Val Lys Arg Lys Gly Val Leu Glu Leu Gln Ser Thr Gly
1745 1750 1755 1760

```
Thr Gly Ala Lys Gly Lys Ile Asn Pro Lys Thr Tyr Thr Ile Lys Gly
                1765                1770                1775

Glu Gln Leu Lys Ala Leu Gln Glu Asn Met Leu His Phe Phe Val Glu
            1780                1785                1790

Pro Leu Arg Asn Gly Ile Thr Gln Thr Val Gly Glu Ser Leu Val Tyr
        1795                1800                1805

Ser Thr Glu Gln Leu Gln Lys Ala Thr Gln Ile Gln Ser Val Val Leu
    1810                1815                1820

Glu Asp Met Phe Lys Gln Arg Val Gln Glu Lys Leu Ala Glu Lys Ala
1825                1830                1835                1840

Lys Asp Pro Thr Trp Lys Lys Gly Asp Phe Leu Thr Gln Lys Glu Leu
                1845                1850                1855

Asn Asp Ile Gln Ala Ser Leu Asn Asn Leu Ala Pro Met Ile Glu Thr
            1860                1865                1870

Gly Ser Gln Thr Phe Tyr Ile Ala Gly Ser Glu Asn Ala Glu Val Ala
        1875                1880                1885

Asn Gln Val Leu Ala Thr Asn Leu Asp Asp Arg Met Arg Val Pro Met
    1890                1895                1900

Ser Ile Tyr Ala Pro Ala Gln Ala Gly Val Ala Gly Ile Pro Phe Met
1905                1910                1915                1920

Thr Ile Gly Thr Gly Asp Gly Met Met Met Gln Thr Leu Ser Thr Met
                1925                1930                1935

Lys Gly Ala Pro Lys Asn Thr Leu Lys Ile Phe Asp Gly Met Asn Ile
            1940                1945                1950

Gly Leu Asn Asp Ile Thr Asp Ala Ser Arg Lys Ala Asn Glu Ala Val
        1955                1960                1965

Tyr Thr Ser Trp Gln Gly Asn Pro Ile Lys Asn Val Tyr Glu Ser Tyr
    1970                1975                1980

Ala Lys Phe Met Lys Asn Val Asp Phe Ser Lys Leu Ser Pro Glu Ala
1985                1990                1995                2000

Leu Glu Ala Ile Gly Lys Ser Ala Leu Glu Tyr Asp Gln Arg Glu Asn
                2005                2010                2015

Ala Thr Val Asp Asp Ile Ala Asn Ala Ala Ser Leu Ile Glu Arg Asn
            2020                2025                2030

Leu Arg Asn Ile Ala Leu Gly Val Asp Ile Arg His Lys Val Leu Asp
        2035                2040                2045

Lys Val Asn Leu Ser Ile Asp Gln Met Ala Ala Val Gly Ala Pro Tyr
    2050                2055                2060

Gln Asn Asn Gly Lys Ile Asp Leu Ser Asn Met Thr Pro Glu Gln Gln
2065                2070                2075                2080
```

Ala Asp Glu Leu Asn Lys Leu Phe Arg Glu Glu Leu Glu Ala Arg Lys
2085 2090 2095

Gln Lys Val Ala Lys Ala Arg Ala Glu Val Lys Glu Glu Thr Val Ser
2100 2105 2110

Glu Lys Glu Pro Val Asn Pro Asp Phe Gly Met Val Gly Arg Glu His
2115 2120 2125

Lys Ala Ser Gly Val Arg Ile Leu Ser Ala Thr Ala Ile Arg Asn Leu
2130 2135 2140

Ala Lys Ile Ser Asn Leu Pro Ser Thr Gln Ala Ala Thr Leu Ala Glu
2145 2150 2155 2160

Ile Gln Lys Ser Leu Ala Ala Lys Asp Tyr Lys Ile Ile Tyr Gly Thr
2165 2170 2175

Pro Thr Gln Val Ala Glu Tyr Ala Arg Gln Lys Asn Val Thr Glu Leu
2180 2185 2190

Thr Ser Gln Glu Met Glu Glu Ala Gln Ala Gly Asn Ile Tyr Gly Trp
2195 2200 2205

Thr Asn Phe Asp Asp Lys Thr Ile Tyr Leu Val Ser Pro Ser Met Glu
2210 2215 2220

Thr Leu Ile His Glu Leu Val His Ala Ser Thr Phe Glu Glu Val Tyr
2225 2230 2235 2240

Ser Phe Tyr Gln Gly Asn Glu Val Ser Pro Thr Ser Lys Gln Ala Ile
2245 2250 2255

Glu Asn Leu Glu Gly Leu Met Glu Gln Phe Arg Ser Leu Asp Ile Ser
2260 2265 2270

Lys Asp Ser Pro Glu Met Arg Glu Ala Tyr Ala Asp Ala Ile Ala Thr
2275 2280 2285

Ile Glu Gly His Leu Ser Asn Gly Phe Val Asp Pro Ala Ile Ser Lys
2290 2295 2300

Ala Ala Ala Leu Asn Glu Phe Met Ala Trp Gly Leu Ala Asn Arg Ala
2305 2310 2315 2320

Leu Ala Ala Lys Gln Lys Arg Thr Ser Ser Leu Val Gln Met Val Lys
2325 2330 2335

Asp Val Tyr Gln Ala Ile Lys Lys Leu Ile Trp Gly Arg Lys Gln Ala
2340 2345 2350

Pro Ala Leu Gly Glu Asp Met Phe Ser Asn Leu Leu Phe Asn Ser Ala
2355 2360 2365

Ile Leu Met Arg Ser Gln Pro Thr Thr Gln Ala Val Ala Lys Asp Gly
2370 2375 2380

Thr Leu Phe His Ser Lys Ala Tyr Gly Asn Asn Glu Arg Leu Ser Gln
2385 2390 2395 2400

Leu Asn Gln Thr Phe Asp Lys Leu Val Thr Asp Tyr Leu Arg Thr Asp

```
                2405                2410                2415

Pro Val Thr Glu Val Glu Arg Arg Gly Asn Val Ala Asn Ala Leu Met
            2420                2425                2430

Ser Ala Thr Arg Leu Val Arg Asp Val Gln Ser His Gly Phe Asn Met
        2435                2440                2445

Thr Ala Gln Glu Gln Ser Val Phe Gln Met Val Thr Ala Ala Leu Ala
    2450                2455                2460

Thr Glu Ala Ala Ile Asp Pro His Ala Met Ala Arg Ala Gln Glu Leu
2465                2470                2475                2480

Tyr Thr His Val Met Lys His Leu Thr Val Glu His Phe Met Ala Asp
                2485                2490                2495

Pro Asp Ser Thr Asn Pro Ala Asp Arg Tyr Tyr Ala Gln Gln Lys Tyr
            2500                2505                2510

Asp Thr Ile Ser Gly Ala Asn Leu Val Glu Val Asp Ala Lys Gly Arg
        2515                2520                2525

Thr Ser Leu Leu Pro Thr Phe Leu Gly Leu Ala Met Val Asn Glu Glu
    2530                2535                2540

Leu Arg Ser Ile Ile Lys Glu Met Pro Val Pro Lys Ala Asp Lys Lys
2545                2550                2555                2560

Leu Gly Asn Asp Ile Asp Thr Leu Leu Thr Asn Ala Gly Thr Gln Val
                2565                2570                2575

Met Glu Ser Leu Asn Arg Arg Met Ala Gly Asp Gln Lys Ala Thr Asn
            2580                2585                2590

Val Gln Asp Ser Ile Asp Ala Leu Ser Glu Thr Ile Met Ala Ala Ala
        2595                2600                2605

Leu Lys Arg Glu Ser Phe Tyr Asp Ala Val Ala Thr Pro Thr Gly Asn
    2610                2615                2620

Phe Ile Asp Arg Ala Asn Gln Tyr Val Thr Asp Ser Ile Glu Arg Leu
2625                2630                2635                2640

Ser Glu Thr Val Ile Glu Lys Ala Asp Lys Val Ile Ala Asn Pro Ser
                2645                2650                2655

Asn Ile Ala Ala Lys Gly Val Ala His Leu Ala Lys Leu Thr Ala Ala
            2660                2665                2670

Ile Ala Ser Glu Lys Gln Gly Glu Ile Val Ala Gln Gly Val Met Thr
        2675                2680                2685

Ala Met Asn Gln Gly Lys Val Trp Gln Pro Phe His Asp Leu Val Asn
    2690                2695                2700

Asp Ile Val Gly Arg Thr Lys Thr Asn Ala Asn Val Tyr Asp Leu Ile
2705                2710                2715                2720

Lys Leu Val Lys Ser Gln Ile Ser Gln Asp Arg Gln Gln Phe Arg Glu
                2725                2730                2735
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His Leu Pro Thr Val Ile Ala Gly Lys Phe Ser Arg Lys Leu Thr Asp
           2740                2745                2750

Thr Glu Trp Ser Ala Met His Thr Gly Leu Gly Lys Thr Asp Leu Ala
       2755                2760                2765

Val Leu Arg Glu Thr Met Ser Met Ala Glu Ile Arg Asp Leu Leu Ser
   2770                2775                2780

Ser Ser Lys Lys Val Lys Asp Glu Ile Ser Thr Leu Glu Lys Glu Ile
2785                2790                2795                2800

Gln Asn Gln Ala Gly Arg Asn Trp Asn Leu Val Gln Lys Lys Ser Lys
               2805                2810                2815

Gln Leu Ala Gln Tyr Met Ile Met Gly Glu Val Gly Asn Asn Leu Leu
           2820                2825                2830

Arg Asn Ala His Ala Ile Ser Arg Leu Leu Gly Glu Arg Ile Thr Asn
       2835                2840                2845

Gly Pro Val Ala Asp Val Ala Ala Ile Asp Lys Leu Ile Thr Leu Tyr
   2850                2855                2860

Ser Leu Glu Leu Met Asn Lys Ser Asp Arg Asp Leu Leu Ser Glu Leu
2865                2870                2875                2880

Ala Gln Ser Glu Val Glu Gly Met Glu Phe Ser Ile Ala Tyr Met Val
               2885                2890                2895

Gly Gln Arg Thr Glu Glu Met Arg Lys Ala Lys Gly Asp Asn Arg Thr
           2900                2905                2910

Leu Leu Asn His Phe Lys Gly Tyr Ile Pro Val Glu Asn Gln Gln Gly
       2915                2920                2925

Val Asn Leu Ile Ile Ala Asp Asp Lys Glu Phe Ala Lys Leu Asn Ser
   2930                2935                2940

Gln Ser Phe Thr Arg Ile Gly Thr Tyr Gln Gly Ser Thr Gly Phe Arg
2945                2950                2955                2960

Thr Gly Ser Lys Gly Tyr Tyr Phe Ser Pro Val Ala Ala Arg Ala Pro
               2965                2970                2975

Tyr Ser Gln Gly Ile Leu Gln Asn Val Arg Asn Thr Ala Gly Gly Val
           2980                2985                2990

Asp Ile Gly Thr Gly Phe Thr Leu Gly Thr Met Val Ala Gly Arg Ile
       2995                3000                3005

Thr Asp Lys Pro Thr Val Glu Arg Ile Thr Lys Ala Leu Ala Lys Gly
   3010                3015                3020

Glu Arg Gly Arg Glu Pro Leu Met Pro Ile Tyr Asn Ser Lys Gly Gln
3025                3030                3035                3040

Val Val Ala Tyr Glu Gln Ser Val Asp Pro Asn Met Leu Lys His Leu
               3045                3050                3055
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Asn Gln Asp Asn His Phe Ala Lys Met Val Gly Val Trp Arg Gly Arg
           3060                3065                3070

Gln Val Glu Glu Ala Lys Ala Gln Arg Phe Asn Asp Ile Leu Ile Glu
       3075                3080                3085

Gln Leu His Ala Met Tyr Glu Lys Asp Ile Lys Asp Ser Ser Ala Asn
   3090                3095                3100

Lys Ser Gln Tyr Val Asn Leu Leu Gly Lys Ile Asp Asp Pro Val Leu
3105                3110                3115                3120

Ala Asp Ala Ile Asn Leu Met Asn Ile Glu Thr Arg His Lys Ala Glu
               3125                3130                3135

Glu Leu Phe Gly Lys Asp Glu Leu Trp Val Arg Arg Asp Met Leu Asn
           3140                3145                3150

Asp Ala Leu Gly Tyr Arg Ala Ala Ser Ile Gly Asp Val Trp Thr Gly
       3155                3160                3165

Asn Ser Arg Trp Ser Pro Ser Thr Leu Asp Thr Val Lys Lys Met Phe
   3170                3175                3180

Leu Gly Ala Phe Gly Asn Lys Ala Tyr His Val Val Met Asn Ala Glu
3185                3190                3195                3200

Asn Thr Ile Gln Asn Leu Val Lys Asp Ala Lys Thr Val Ile Val Val
               3205                3210                3215

Lys Ser Val Val Val Pro Ala Val Asn Phe Leu Ala Asn Ile Tyr Gln
           3220                3225                3230

Met Ile Gly Arg Gly Val Pro Val Lys Asp Ile Ala Val Asn Ile Pro
       3235                3240                3245

Arg Lys Thr Ser Glu Ile Asn Gln Tyr Ile Lys Ser Arg Leu Arg Gln
   3250                3255                3260

Ile Asp Ala Glu Ala Glu Leu Arg Ala Ala Glu Gly Asn Pro Asn Leu
3265                3270                3275                3280

Val Arg Lys Leu Lys Thr Glu Ile Gln Ser Ile Thr Asp Ser His Arg
               3285                3290                3295

Arg Met Ser Ile Trp Pro Leu Ile Glu Ala Gly Glu Phe Ser Ser Ile
           3300                3305                3310

Ala Asp Ala Gly Ile Ser Arg Asp Asp Leu Leu Val Ala Glu Gly Lys
       3315                3320                3325

Ile His Glu Tyr Met Glu Lys Leu Ala Asn Lys Leu Pro Glu Lys Val
   3330                3335                3340

Arg Asn Ala Gly Arg Tyr Ala Leu Ile Ala Lys Asp Thr Ala Leu Phe
3345                3350                3355                3360

Gln Gly Ile Gln Lys Thr Val Glu Tyr Ser Asp Phe Ile Ala Lys Ala
               3365                3370                3375

Ile Ile Tyr Asp Asp Leu Val Lys Arg Lys Lys Lys Ser Ser Ser Glu
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          3380                3385                3390

Ala Leu Gly Gln Val Thr Glu Glu Phe Ile Asn Tyr Asp Arg Leu Pro
       3395                3400                3405

Gly Arg Phe Arg Gly Tyr Met Glu Ser Met Gly Leu Met Trp Phe Tyr
   3410                3415                3420

Asn Phe Lys Ile Arg Ser Ile Lys Val Ala Met Ser Met Ile Arg Asn
3425                3430                3435                3440

Asn Pro Val His Ser Leu Ile Ala Thr Val Val Pro Ala Pro Thr Met
               3445                3450                3455

Phe Gly Asn Val Gly Leu Pro Ile Gln Asp Asn Met Leu Thr Met Leu
           3460                3465                3470

Ala Glu Gly Arg Leu Asp Tyr Ser Leu Gly Phe Gly Gln Gly Leu Arg
       3475                3480                3485

Ala Pro Thr Leu Asn Pro Trp Phe Asn Leu Thr His
   3490                3495                3500


<210> 3
<211> 3318
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:  Synthetic
      Primer

<400> 3
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ccagaagaac agaaatcccg tactgttggt tcagaagcac ctctaaaaga tgtagcccaa 180
gctctgtctt ctcgtgctcg ttatgaactc tttactgaga aagaaactgc taaccctgct 240
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gatattcttc gctcccgtct ggctaagttc cttaacacta aggatgttgg taaacgtttt 360
gctcaaggta cagaagccaa ccgttgggta ggtggtaagt tacttaacat tgttgagcag 420
gatggggata cctttaagta caacgaacaa ttgctacaga ctgctgtatt agcaggtctt 480
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gagaagatgt tctttggtga tgacattcct cctgtagcta atactcagct tcgtaaccct 960
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acagcattag gagataggaa gtcattcgta gcattgatgg ctcttatgga gtattcccgt 1620
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aaagtcgcta aggctagg                                              3318
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<210> 4
<211> 1107
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic Peptide

<400> 4

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Met Glu Ser Thr Val Thr Glu Glu Leu Lys Glu Gly Ile Asp Ala Val
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Tyr Pro Ser Leu Val Gly Thr Ala Asp Ser Lys Ala Glu Gly Ile Lys
             20                  25                  30

Asn Tyr Phe Lys Leu Ser Phe Thr Leu Pro Glu Glu Gln Lys Ser Arg
         35                  40                  45

Thr Val Gly Ser Glu Ala Pro Leu Lys Asp Val Ala Gln Ala Leu Ser
     50                  55                  60

Ser Arg Ala Arg Tyr Glu Leu Phe Thr Glu Lys Glu Thr Ala Asn Pro
 65                  70                  75                  80

Ala Phe Asn Gly Glu Val Ile Lys Arg Tyr Lys Glu Leu Met Glu His
                 85                  90                  95

Gly Glu Gly Ile Ala Asp Ile Leu Arg Ser Arg Leu Ala Lys Phe Leu
            100                 105                 110
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Asn Thr Lys Asp Val Gly Lys Arg Phe Ala Gln Gly Thr Glu Ala Asn
        115                 120                 125

Arg Trp Val Gly Gly Lys Leu Leu Asn Ile Val Glu Gln Asp Gly Asp
    130                 135                 140

Thr Phe Lys Tyr Asn Glu Gln Leu Leu Gln Thr Ala Val Leu Ala Gly
145                 150                 155                 160

Leu Gln Trp Arg Leu Thr Ala Thr Ser Asn Thr Ala Ile Lys Asp Ala
                165                 170                 175

Lys Asp Val Ala Ala Ile Thr Gly Ile Asp Gln Ala Leu Leu Pro Glu
            180                 185                 190

Gly Leu Val Glu Gln Phe Asp Thr Gly Met Thr Leu Thr Glu Ala Val
        195                 200                 205

Ser Ser Leu Ala Gln Lys Ile Glu Ser Tyr Trp Gly Leu Ser Arg Asn
    210                 215                 220

Pro Asn Ala Pro Leu Gly Tyr Thr Lys Gly Ile Pro Thr Ala Met Ala
225                 230                 235                 240

Ala Glu Ile Leu Ala Ala Phe Val Glu Ser Thr Asp Val Val Glu Asn
                245                 250                 255

Ile Val Asp Met Ser Glu Ile Asp Pro Asp Asn Lys Lys Thr Ile Gly
            260                 265                 270

Leu Tyr Thr Ile Thr Glu Leu Asp Ser Phe Asp Pro Ile Asn Ser Phe
        275                 280                 285

Pro Thr Ala Ile Glu Glu Ala Val Leu Val Asn Pro Thr Glu Lys Met
    290                 295                 300

Phe Phe Gly Asp Asp Ile Pro Pro Val Ala Asn Thr Gln Leu Arg Asn
305                 310                 315                 320

Pro Ala Val Arg Asn Thr Pro Glu Gln Lys Ala Ala Leu Lys Ala Glu
                325                 330                 335

Gln Ala Thr Glu Phe Tyr Val His Thr Pro Met Val Gln Phe Tyr Glu
            340                 345                 350

Thr Leu Gly Lys Asp Arg Ile Leu Glu Leu Met Gly Ala Gly Thr Leu
        355                 360                 365

Asn Lys Glu Leu Leu Asn Asp Asn His Ala Lys Ser Leu Glu Gly Lys
    370                 375                 380

Asn Arg Ser Val Glu Asp Ser Tyr Asn Gln Leu Phe Ser Val Ile Glu
385                 390                 395                 400

Gln Val Arg Ala Gln Ser Glu Asp Ile Ser Thr Val Pro Ile His Tyr
                405                 410                 415

Ala Tyr Asn Met Thr Arg Val Gly Arg Met Gln Met Leu Gly Lys Tyr
            420                 425                 430
```

```
Asn Pro Gln Ser Ala Lys Leu Val Arg Glu Ala Ile Leu Pro Thr Lys
        435                 440                 445

Ala Thr Leu Asp Leu Ser Asn Gln Asn Asn Glu Asp Phe Ser Ala Phe
    450                 455                 460

Gln Leu Gly Leu Ala Gln Ala Leu Asp Ile Lys Val His Thr Met Thr
465                 470                 475                 480

Arg Glu Val Met Ser Asp Glu Leu Thr Lys Leu Leu Glu Gly Asn Leu
                485                 490                 495

Lys Pro Ala Ile Asp Met Met Val Glu Phe Asn Thr Thr Gly Ser Leu
            500                 505                 510

Pro Glu Asn Ala Val Asp Val Leu Asn Thr Ala Leu Gly Asp Arg Lys
        515                 520                 525

Ser Phe Val Ala Leu Met Ala Leu Met Glu Tyr Ser Arg Tyr Leu Val
    530                 535                 540

Ala Glu Asp Lys Ser Ala Phe Val Thr Pro Leu Tyr Val Glu Ala Asp
545                 550                 555                 560

Gly Val Thr Asn Gly Pro Ile Asn Ala Met Met Leu Met Thr Gly Gly
                565                 570                 575

Leu Phe Thr Pro Asp Trp Ile Arg Asn Ile Ala Lys Gly Gly Leu Phe
            580                 585                 590

Ile Gly Ser Pro Asn Lys Thr Met Asn Glu His Arg Ser Thr Ala Asp
        595                 600                 605

Asn Asn Asp Leu Tyr Gln Ala Ser Thr Asn Ala Leu Met Glu Ser Leu
    610                 615                 620

Gly Lys Leu Arg Ser Asn Tyr Ala Ser Asn Met Pro Ile Gln Ser Gln
625                 630                 635                 640

Ile Asp Ser Leu Leu Ser Leu Met Asp Leu Phe Leu Pro Asp Ile Asn
                645                 650                 655

Leu Gly Glu Asn Gly Ala Leu Glu Leu Lys Arg Gly Ile Ala Lys Asn
            660                 665                 670

Pro Leu Thr Ile Thr Ile Tyr Gly Ser Gly Ala Arg Gly Ile Ala Gly
        675                 680                 685

Lys Leu Val Ser Ser Val Thr Asp Ala Ile Tyr Glu Arg Met Ser Asp
    690                 695                 700

Val Leu Lys Ala Arg Ala Lys Asp Pro Asn Ile Ser Ala Ala Met Ala
705                 710                 715                 720

Met Phe Gly Lys Gln Ala Ala Ser Glu Ala His Ala Glu Glu Leu Leu
                725                 730                 735

Ala Arg Phe Leu Lys Asp Met Glu Thr Leu Thr Ser Thr Val Pro Val
            740                 745                 750

Lys Arg Lys Gly Val Leu Glu Leu Gln Ser Thr Gly Thr Gly Ala Lys
```

```
        755                 760                 765

Gly Lys Ile Asn Pro Lys Thr Tyr Thr Ile Lys Gly Glu Gln Leu Lys
    770                 775                 780

Ala Leu Gln Glu Asn Met Leu His Phe Phe Val Glu Pro Leu Arg Asn
785                 790                 795                 800

Gly Ile Thr Gln Thr Val Gly Glu Ser Leu Val Tyr Ser Thr Glu Gln
                805                 810                 815

Leu Gln Lys Ala Thr Gln Ile Gln Ser Val Val Leu Glu Asp Met Phe
            820                 825                 830

Lys Gln Arg Val Gln Glu Lys Leu Ala Glu Lys Ala Lys Asp Pro Thr
        835                 840                 845

Trp Lys Lys Gly Asp Phe Leu Thr Gln Lys Glu Leu Asn Asp Ile Gln
    850                 855                 860

Ala Ser Leu Asn Asn Leu Ala Pro Met Ile Glu Thr Gly Ser Gln Thr
865                 870                 875                 880

Phe Tyr Ile Ala Gly Ser Glu Asn Ala Glu Val Ala Asn Gln Val Leu
                885                 890                 895

Ala Thr Asn Leu Asp Asp Arg Met Arg Val Pro Met Ser Ile Tyr Ala
            900                 905                 910

Pro Ala Gln Ala Gly Val Ala Gly Ile Pro Phe Met Thr Ile Gly Thr
        915                 920                 925

Gly Asp Gly Met Met Met Gln Thr Leu Ser Thr Met Lys Gly Ala Pro
    930                 935                 940

Lys Asn Thr Leu Lys Ile Phe Asp Gly Met Asn Ile Gly Leu Asn Asp
945                 950                 955                 960

Ile Thr Asp Ala Ser Arg Lys Ala Asn Glu Ala Val Tyr Thr Ser Trp
                965                 970                 975

Gln Gly Asn Pro Ile Lys Asn Val Tyr Glu Ser Tyr Ala Lys Phe Met
            980                 985                 990

Lys Asn Val Asp Phe Ser Lys Leu Ser Pro Glu Ala Leu Glu Ala Ile
        995                1000                1005

Gly Lys Ser Ala Leu Glu Tyr Asp Gln Arg Glu Asn Ala Thr Val Asp
   1010                1015                1020

Asp Ile Ala Asn Ala Ala Ser Leu Ile Glu Arg Asn Leu Arg Asn Ile
1025                1030                1035                1040

Ala Leu Gly Val Asp Ile Arg His Lys Val Leu Asp Lys Val Asn Leu
                1045                1050                1055

Ser Ile Asp Gln Met Ala Ala Val Gly Ala Pro Tyr Gln Asn Asn Gly
            1060                1065                1070

Lys Ile Asp Leu Ser Asn Met Thr Pro Glu Gln Gln Ala Asp Glu Leu
        1075                1080                1085
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Asn Lys Leu Phe Arg Glu Glu Leu Glu Ala Arg Lys Gln Lys Val Ala
1090 1095 1100

Lys Ala Arg
1105

<210> 5
<211> 3432
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic Primer

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gttacagaag aattaaaaga aggtattgat gctgtttacc cttcattggt aggtactgct 180
gattctaaag cagagggtat taagaactat ttcaaattgt cctttacctt accagaagaa 240
cagaaatccc gtactgttgg ttcagaagca cctctaaaag atgtagccca agctctgtct 300
tctcgtgctc gttatgaact ctttactgag aaagaaactg ctaaccctgc ttttaatggg 360
gaagttatta agcgatacaa agaactcatg gaacatgggg aaggtattgc tgatattctt 420
cgctcccgtc tggctaagtt ccttaacact aaggatgttg gtaaacgttt tgctcaaggt 480
acagaagcca accgttgggt aggtggtaag ttacttaaca ttgttgagca ggatggggat 540
acctttaagt acaacgaaca attgctacag actgctgtat tagcaggtct tcaatggaga 600
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ggtgctcctt atcagaacaa cggtaagatt gacctcagca atatgacccc tgaacaacag 3360
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<210> 6
<211> 1143
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic Peptide

<400> 6

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Gly Gly Gln Gln Met Gly Arg Asp Leu Tyr Asp Asp Asp Asp Lys Asp
             20                  25                  30

Pro Ser Ser Arg Ser Glu Ser Thr Val Thr Glu Glu Leu Lys Glu Gly
         35                  40                  45

Ile Asp Ala Val Tyr Pro Ser Leu Val Gly Thr Ala Asp Ser Lys Ala
     50                  55                  60

Glu Gly Ile Lys Asn Tyr Phe Lys Leu Ser Phe Thr Leu Pro Glu Glu
 65                  70                  75                  80

Gln Lys Ser Arg Thr Val Gly Ser Glu Ala Pro Leu Lys Asp Val Ala
                 85                  90                  95

Gln Ala Leu Ser Ser Arg Ala Arg Tyr Glu Leu Phe Thr Glu Lys Glu
            100                 105                 110

Thr Ala Asn Pro Ala Phe Asn Gly Glu Val Ile Lys Arg Tyr Lys Glu
        115                 120                 125

Leu Met Glu His Gly Glu Gly Ile Ala Asp Ile Leu Arg Ser Arg Leu
    130                 135                 140

Ala Lys Phe Leu Asn Thr Lys Asp Val Gly Lys Arg Phe Ala Gln Gly
145                 150                 155                 160

Thr Glu Ala Asn Arg Trp Val Gly Gly Lys Leu Leu Asn Ile Val Glu
                165                 170                 175

Gln Asp Gly Asp Thr Phe Lys Tyr Asn Glu Gln Leu Leu Gln Thr Ala
```

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            180                 185                 190

Val Leu Ala Gly Leu Gln Trp Arg Leu Thr Ala Thr Ser Asn Thr Ala
        195                 200                 205

Ile Lys Asp Ala Lys Asp Val Ala Ala Ile Thr Gly Ile Asp Gln Ala
    210                 215                 220

Leu Leu Pro Glu Gly Leu Val Glu Gln Phe Asp Thr Gly Met Thr Leu
225                 230                 235                 240

Thr Glu Ala Val Ser Ser Leu Ala Gln Lys Ile Glu Ser Tyr Trp Gly
                245                 250                 255

Leu Ser Arg Asn Pro Asn Ala Pro Leu Gly Tyr Thr Lys Gly Ile Pro
            260                 265                 270

Thr Ala Met Ala Ala Glu Ile Leu Ala Ala Phe Val Glu Ser Thr Asp
        275                 280                 285

Val Val Glu Asn Ile Val Asp Met Ser Glu Ile Asp Pro Asp Asn Lys
    290                 295                 300

Lys Thr Ile Gly Leu Tyr Thr Ile Thr Glu Leu Asp Ser Phe Asp Pro
305                 310                 315                 320

Ile Asn Ser Phe Pro Thr Ala Ile Glu Glu Ala Val Leu Val Asn Pro
                325                 330                 335

Thr Glu Lys Met Phe Phe Gly Asp Asp Ile Pro Pro Val Ala Asn Thr
            340                 345                 350

Gln Leu Arg Asn Pro Ala Val Arg Asn Thr Pro Glu Gln Lys Ala Ala
        355                 360                 365

Leu Lys Ala Glu Gln Ala Thr Glu Phe Tyr Val His Thr Pro Met Val
    370                 375                 380

Gln Phe Tyr Glu Thr Leu Gly Lys Asp Arg Ile Leu Glu Leu Met Gly
385                 390                 395                 400

Ala Gly Thr Leu Asn Lys Glu Leu Leu Asn Asp Asn His Ala Lys Ser
                405                 410                 415

Leu Glu Gly Lys Asn Arg Ser Val Glu Asp Ser Tyr Asn Gln Leu Phe
            420                 425                 430

Ser Val Ile Glu Gln Val Arg Ala Gln Ser Glu Asp Ile Ser Thr Val
        435                 440                 445

Pro Ile His Tyr Ala Tyr Asn Met Thr Arg Val Gly Arg Met Gln Met
    450                 455                 460

Leu Gly Lys Tyr Asn Pro Gln Ser Ala Lys Leu Val Arg Glu Ala Ile
465                 470                 475                 480

Leu Pro Thr Lys Ala Thr Leu Asp Leu Ser Asn Gln Asn Asn Glu Asp
                485                 490                 495

Phe Ser Ala Phe Gln Leu Gly Leu Ala Gln Ala Leu Asp Ile Lys Val
            500                 505                 510
```

```
His Thr Met Thr Arg Glu Val Met Ser Asp Glu Leu Thr Lys Leu Leu
        515                 520                 525

Glu Gly Asn Leu Lys Pro Ala Ile Asp Met Met Val Glu Phe Asn Thr
    530                 535                 540

Thr Gly Ser Leu Pro Glu Asn Ala Val Asp Val Leu Asn Thr Ala Leu
545                 550                 555                 560

Gly Asp Arg Lys Ser Phe Val Ala Leu Met Ala Leu Met Glu Tyr Ser
                565                 570                 575

Arg Tyr Leu Val Ala Glu Asp Lys Ser Ala Phe Val Thr Pro Leu Tyr
            580                 585                 590

Val Glu Ala Asp Gly Val Thr Asn Gly Pro Ile Asn Ala Met Met Leu
        595                 600                 605

Met Thr Gly Gly Leu Phe Thr Pro Asp Trp Ile Arg Asn Ile Ala Lys
    610                 615                 620

Gly Gly Leu Phe Ile Gly Ser Pro Asn Lys Thr Met Asn Glu His Arg
625                 630                 635                 640

Ser Thr Ala Asp Asn Asn Asp Leu Tyr Gln Ala Ser Thr Asn Ala Leu
                645                 650                 655

Met Glu Ser Leu Gly Lys Leu Arg Ser Asn Tyr Ala Ser Asn Met Pro
            660                 665                 670

Ile Gln Ser Gln Ile Asp Ser Leu Leu Ser Leu Met Asp Leu Phe Leu
        675                 680                 685

Pro Asp Ile Asn Leu Gly Glu Asn Gly Ala Leu Glu Leu Lys Arg Gly
    690                 695                 700

Ile Ala Lys Asn Pro Leu Thr Ile Thr Ile Tyr Gly Ser Gly Ala Arg
705                 710                 715                 720

Gly Ile Ala Gly Lys Leu Val Ser Ser Val Thr Asp Ala Ile Tyr Glu
                725                 730                 735

Arg Met Ser Asp Val Leu Lys Ala Arg Ala Lys Asp Pro Asn Ile Ser
            740                 745                 750

Ala Ala Met Ala Met Phe Gly Lys Gln Ala Ala Ser Glu Ala His Ala
        755                 760                 765

Glu Glu Leu Leu Ala Arg Phe Leu Lys Asp Met Glu Thr Leu Thr Ser
    770                 775                 780

Thr Val Pro Val Lys Arg Lys Gly Val Leu Glu Leu Gln Ser Thr Gly
785                 790                 795                 800

Thr Gly Ala Lys Gly Lys Ile Asn Pro Lys Thr Tyr Thr Ile Lys Gly
                805                 810                 815

Glu Gln Leu Lys Ala Leu Gln Glu Asn Met Leu His Phe Phe Val Glu
            820                 825                 830
```

```
Pro Leu Arg Asn Gly Ile Thr Gln Thr Val Gly Glu Ser Leu Val Tyr
        835                 840                 845

Ser Thr Glu Gln Leu Gln Lys Ala Thr Gln Ile Gln Ser Val Val Leu
    850                 855                 860

Glu Asp Met Phe Lys Gln Arg Val Gln Glu Lys Leu Ala Glu Lys Ala
865                 870                 875                 880

Lys Asp Pro Thr Trp Lys Lys Gly Asp Phe Leu Thr Gln Lys Glu Leu
                885                 890                 895

Asn Asp Ile Gln Ala Ser Leu Asn Asn Leu Ala Pro Met Ile Glu Thr
            900                 905                 910

Gly Ser Gln Thr Phe Tyr Ile Ala Gly Ser Glu Asn Ala Glu Val Ala
        915                 920                 925

Asn Gln Val Leu Ala Thr Asn Leu Asp Asp Arg Met Arg Val Pro Met
    930                 935                 940

Ser Ile Tyr Ala Pro Ala Gln Ala Gly Val Ala Gly Ile Pro Phe Met
945                 950                 955                 960

Thr Ile Gly Thr Gly Asp Gly Met Met Met Gln Thr Leu Ser Thr Met
                965                 970                 975

Lys Gly Ala Pro Lys Asn Thr Leu Lys Ile Phe Asp Gly Met Asn Ile
            980                 985                 990

Gly Leu Asn Asp Ile Thr Asp Ala Ser Arg Lys Ala Asn Glu Ala Val
        995                1000                1005

Tyr Thr Ser Trp Gln Gly Asn Pro Ile Lys Asn Val Tyr Glu Ser Tyr
   1010                1015                1020

Ala Lys Phe Met Lys Asn Val Asp Phe Ser Lys Leu Ser Pro Glu Ala
1025                1030                1035                1040

Leu Glu Ala Ile Gly Lys Ser Ala Leu Glu Tyr Asp Gln Arg Glu Asn
                1045                1050                1055

Ala Thr Val Asp Asp Ile Ala Asn Ala Ala Ser Leu Ile Glu Arg Asn
            1060                1065                1070

Leu Arg Asn Ile Ala Leu Gly Val Asp Ile Arg His Lys Val Leu Asp
        1075                1080                1085

Lys Val Asn Leu Ser Ile Asp Gln Met Ala Ala Val Gly Ala Pro Tyr
   1090                1095                1100

Gln Asn Asn Gly Lys Ile Asp Leu Ser Asn Met Thr Pro Glu Gln Gln
1105                1110                1115                1120

Ala Asp Glu Leu Asn Lys Leu Phe Arg Glu Glu Leu Glu Ala Arg Lys
                1125                1130                1135

Gln Lys Val Ala Lys Ala Arg
            1140
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<210> 7
<211> 3432
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic
Primer

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gttacagaag aattaaaaga aggtattgat gctgtttacc cttcattggt aggtactgct 180
gattctaaag cagagggtat taagaactat ttcaaattgt cctttacctt accagaagaa 240
cagaaatccc gtactgttgg ttcagaagca cctctaaaag atgtagccca agctctgtct 300
tctcgtgctc gttatgaact ctttactgag aaagaaactg ctaaccctgc ttttaatggg 360
gaagttatta agcgatacaa agaactcatg gaacatgggg aaggtattgc tgatattctt 420
cgctcccgtc tggctaagtt ccttaacact aaggatgttg gtaaacgttt tgctcaaggt 480
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<210> 8
<211> 1143
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic Peptide

<400> 8

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Pro Ser Ser Arg Ser Glu Ser Thr Val Thr Glu Glu Leu Lys Glu Gly
         35                  40                  45

Ile Asp Ala Val Tyr Pro Ser Leu Val Gly Thr Ala Asp Ser Lys Ala
     50                  55                  60

Glu Gly Ile Lys Asn Tyr Phe Lys Leu Ser Phe Thr Leu Pro Glu Glu
 65                  70                  75                  80

Gln Lys Ser Arg Thr Val Gly Ser Glu Ala Pro Leu Lys Asp Val Ala
                 85                  90                  95

Gln Ala Leu Ser Ser Arg Ala Arg Tyr Glu Leu Phe Thr Glu Lys Glu
            100                 105                 110

Thr Ala Asn Pro Ala Phe Asn Gly Glu Val Ile Lys Arg Tyr Lys Glu
        115                 120                 125

Leu Met Glu His Gly Glu Gly Ile Ala Asp Ile Leu Arg Ser Arg Leu
    130                 135                 140

Ala Lys Phe Leu Asn Thr Lys Asp Val Gly Lys Arg Phe Ala Gln Gly
145                 150                 155                 160

Thr Glu Ala Asn Arg Trp Val Gly Gly Lys Leu Leu Asn Ile Val Glu
                165                 170                 175

Gln Asp Gly Asp Thr Phe Lys Tyr Asn Glu Gln Leu Leu Gln Thr Ala
            180                 185                 190

Val Leu Ala Gly Leu Gln Trp Arg Leu Thr Ala Thr Ser Asn Thr Ala
        195                 200                 205

Ile Lys Asp Ala Lys Asp Val Ala Ala Ile Thr Gly Ile Asp Gln Ala
    210                 215                 220
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Leu Leu Pro Glu Gly Leu Val Glu Gln Phe Asp Thr Gly Met Thr Leu
225                 230                 235                 240

Thr Glu Ala Val Ser Ser Leu Ala Gln Lys Ile Glu Ser Tyr Trp Gly
                245                 250                 255

Leu Ser Arg Asn Pro Asn Ala Pro Leu Gly Tyr Thr Lys Gly Ile Pro
            260                 265                 270

Thr Ala Met Ala Ala Glu Ile Leu Ala Ala Phe Val Glu Ser Thr Asp
        275                 280                 285

Val Val Glu Asn Ile Val Asp Met Ser Glu Ile Asp Pro Asp Asn Lys
    290                 295                 300

Lys Thr Ile Gly Leu Tyr Thr Ile Thr Glu Leu Asp Ser Phe Asp Pro
305                 310                 315                 320

Ile Asn Ser Phe Pro Thr Ala Ile Glu Glu Ala Val Leu Val Asn Pro
                325                 330                 335

Thr Glu Lys Met Phe Phe Gly Asp Asp Ile Pro Pro Val Ala Asn Thr
            340                 345                 350

Gln Leu Arg Asn Pro Ala Val Arg Asn Thr Pro Glu Gln Lys Ala Ala
        355                 360                 365

Leu Lys Ala Glu Gln Ala Thr Glu Phe Tyr Val His Thr Pro Met Val
    370                 375                 380

Gln Phe Tyr Glu Thr Leu Gly Lys Asp Arg Ile Leu Glu Leu Met Gly
385                 390                 395                 400

Ala Gly Thr Leu Asn Lys Glu Leu Leu Asn Asp Asn His Ala Lys Ser
                405                 410                 415

Leu Glu Gly Lys Asn Arg Ser Val Glu Asp Ser Tyr Asn Gln Leu Phe
            420                 425                 430

Ser Val Ile Glu Gln Val Arg Ala Gln Ser Glu Asp Ile Ser Thr Val
        435                 440                 445

Pro Ile His Tyr Ala Tyr Asn Met Thr Arg Val Gly Arg Met Gln Met
    450                 455                 460

Leu Gly Lys Tyr Asn Pro Gln Ser Ala Lys Leu Val Arg Glu Ala Ile
465                 470                 475                 480

Leu Pro Thr Lys Ala Thr Leu Asp Leu Ser Asn Gln Asn Asn Glu Asp
                485                 490                 495

Phe Ser Ala Phe Gln Leu Gly Leu Ala Gln Ala Leu Asp Ile Lys Val
            500                 505                 510

His Thr Met Thr Arg Glu Val Met Ser Asp Glu Leu Thr Lys Leu Leu
        515                 520                 525

Glu Gly Asn Leu Lys Pro Ala Ile Asp Met Met Val Glu Phe Asn Thr
    530                 535                 540

Thr Gly Ser Leu Pro Glu Asn Ala Val Asp Val Leu Asn Thr Ala Leu
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Gly Asp Arg Lys Ser Phe Val Ala Leu Met Ala Leu Met Glu Tyr Ser
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Arg Tyr Leu Val Ala Glu Asp Lys Ser Ala Phe Val Thr Pro Leu Tyr
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Val Glu Ala Asp Gly Val Thr Asn Gly Pro Ile Asn Ala Met Met Leu
        595                 600                 605

Met Thr Gly Gly Leu Phe Thr Pro Asp Trp Ile Arg Asn Ile Ala Lys
    610                 615                 620

Gly Gly Leu Phe Ile Gly Ser Pro Asn Lys Thr Met Asn Glu His Arg
625                 630                 635                 640

Ser Thr Ala Asp Asn Asn Asp Leu Tyr Gln Ala Ser Thr Asn Ala Leu
                645                 650                 655

Met Glu Ser Leu Gly Lys Leu Arg Ser Asn Tyr Ala Ser Asn Met Pro
            660                 665                 670

Ile Gln Ser Gln Ile Asp Ser Leu Leu Ser Leu Met Asp Leu Phe Leu
        675                 680                 685

Pro Asp Ile Asn Leu Gly Glu Asn Gly Ala Leu Glu Leu Lys Arg Gly
    690                 695                 700

Ile Ala Lys Asn Pro Leu Thr Ile Thr Ile Phe Gly Ser Gly Ala Arg
705                 710                 715                 720

Gly Ile Ala Gly Lys Leu Val Ser Ser Val Thr Asp Ala Ile Tyr Glu
                725                 730                 735

Arg Met Ser Asp Val Leu Lys Ala Arg Ala Lys Asp Pro Asn Ile Ser
            740                 745                 750

Ala Ala Met Ala Met Phe Gly Lys Gln Ala Ala Ser Glu Ala His Ala
        755                 760                 765

Glu Glu Leu Leu Ala Arg Phe Leu Lys Asp Met Glu Thr Leu Thr Ser
    770                 775                 780

Thr Val Pro Val Lys Arg Lys Gly Val Leu Glu Leu Gln Ser Thr Gly
785                 790                 795                 800

Thr Gly Ala Lys Gly Lys Ile Asn Pro Lys Thr Tyr Thr Ile Lys Gly
                805                 810                 815

Glu Gln Leu Lys Ala Leu Gln Glu Asn Met Leu His Phe Phe Val Glu
            820                 825                 830

Pro Leu Arg Asn Gly Ile Thr Gln Thr Val Gly Glu Ser Leu Val Tyr
        835                 840                 845

Ser Thr Glu Gln Leu Gln Lys Ala Thr Gln Ile Gln Ser Val Val Leu
    850                 855                 860

Glu Asp Met Phe Lys Gln Arg Val Gln Glu Lys Leu Ala Glu Lys Ala
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Lys Asp Pro Thr Trp Lys Lys Gly Asp Phe Leu Thr Gln Lys Glu Leu
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Asn Asp Ile Gln Ala Ser Leu Asn Asn Leu Ala Pro Met Ile Glu Thr
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Gly Ser Gln Thr Phe Tyr Ile Ala Gly Ser Glu Asn Ala Glu Val Ala
        915                 920                 925

Asn Gln Val Leu Ala Thr Asn Leu Asp Asp Arg Met Arg Val Pro Met
    930                 935                 940

Ser Ile Tyr Ala Pro Ala Gln Ala Gly Val Ala Gly Ile Pro Phe Met
945                 950                 955                 960

Thr Ile Gly Thr Gly Asp Gly Met Met Met Gln Thr Leu Ser Thr Met
                965                 970                 975

Lys Gly Ala Pro Lys Asn Thr Leu Lys Ile Phe Asp Gly Met Asn Ile
            980                 985                 990

Gly Leu Asn Asp Ile Thr Asp Ala Ser Arg Lys Ala Asn Glu Ala Val
        995                1000                1005

Tyr Thr Ser Trp Gln Gly Asn Pro Ile Lys Asn Val Tyr Glu Ser Tyr
   1010                1015                1020

Ala Lys Phe Met Lys Asn Val Asp Phe Ser Lys Leu Ser Pro Glu Ala
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Leu Glu Ala Ile Gly Lys Ser Ala Leu Glu Tyr Asp Gln Arg Glu Asn
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Ala Thr Val Asp Asp Ile Ala Asn Ala Ala Ser Leu Ile Glu Arg Asn
           1060                1065                1070

Leu Arg Asn Ile Ala Leu Gly Val Asp Ile Arg His Lys Val Leu Asp
       1075                1080                1085

Lys Val Asn Leu Ser Ile Asp Gln Met Ala Ala Val Gly Ala Pro Tyr
   1090                1095                1100

Gln Asn Asn Gly Lys Ile Asp Leu Ser Asn Met Thr Pro Glu Gln Gln
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Ala Asp Glu Leu Asn Lys Leu Phe Arg Glu Glu Leu Glu Ala Arg Lys
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Gln Lys Val Ala Lys Ala Arg
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<210> 9
<211> 69
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic Primer

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<210> 10
<211> 69
<212> DNA
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<220>
<223> Description of Artificial Sequence: Synthetic
Primer

<400> 10
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cggagcttc 69

<210> 11
<211> 69
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic
Primer

<400> 11
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cggagcttc 69

<210> 12
<211> 69
<212> DNA
<213> Artificial Sequence

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<223> Description of Artificial Sequence: Synthetic
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cggagcttc 69

<210> 13
<211> 69
<212> DNA
<213> Artificial Sequence

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cggagcttc 69

<210> 14
<211> 10617
<212> DNA
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cattctctga ttgctacagt agtacctgct cctaccatgt ttggtaacgt aggtctacca 10500
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<220>
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<400> 15

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Gly Gly Gln Gln Met Gly Arg Asp Leu Tyr Asp Asp Asp Asp Lys Asp
             20                  25                  30

Pro Ser Ser Arg Ser Met Ser Val Phe Asp Arg Leu Ala Gly Phe Ala
         35                  40                  45

Asp Ser Val Thr Asn Ala Lys Gln Val Asp Val Ser Thr Ala Thr Ala
     50                  55                  60

Gln Lys Lys Ala Glu Gln Gly Val Thr Thr Pro Leu Val Ser Pro Asp
 65                  70                  75                  80

Ala Ala Tyr Gln Met Gln Ala Ala Arg Thr Gly Asn Val Gly Ala Asn
                 85                  90                  95

Ala Phe Glu Pro Gly Thr Val Gln Ser Asp Phe Met Asn Leu Thr Pro
            100                 105                 110

Met Gln Ile Met Asn Lys Tyr Gly Val Glu Gln Gly Leu Gln Leu Ile
        115                 120                 125

Asn Ala Arg Ala Asp Ala Gly Asn Gln Val Phe Asn Asp Ser Val Thr
    130                 135                 140

Thr Arg Thr Pro Gly Glu Glu Leu Gly Asp Ile Ala Thr Gly Val Gly
145                 150                 155                 160

Leu Gly Phe Val Asn Thr Leu Gly Gly Ile Gly Ala Leu Gly Ala Gly
                165                 170                 175

Leu Leu Asn Asp Asp Ala Gly Ala Val Val Ala Gln Gln Leu Ser Lys
            180                 185                 190

Phe Asn Asp Ala Val His Ala Thr Gln Ser Gln Ala Leu Gln Asp Lys
        195                 200                 205

Arg Lys Leu Phe Ala Ala Arg Asn Leu Met Asn Glu Val Glu Ser Glu
    210                 215                 220

Arg Gln Tyr Gln Thr Asp Lys Lys Glu Gly Thr Asn Asp Ile Val Ala
225                 230                 235                 240
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Ser Leu Ser Lys Phe Gly Arg Asp Phe Val Gly Ser Ile Glu Asn Ala
                245                 250                 255

Ala Gln Thr Asp Ser Ile Ile Ser Asp Gly Leu Ala Glu Gly Val Gly
            260                 265                 270

Ser Leu Leu Gly Ala Gly Pro Val Leu Arg Gly Ala Ser Leu Leu Gly
        275                 280                 285

Lys Ala Val Val Pro Ala Asn Thr Leu Arg Ser Ala Ala Leu Ala Gly
    290                 295                 300

Ala Ile Asp Ala Gly Thr Gly Thr Gln Ser Leu Ala Arg Ile Ala Ser
305                 310                 315                 320

Thr Val Gly Arg Ala Ala Pro Gly Met Val Gly Val Gly Ala Met Glu
                325                 330                 335

Ala Gly Gly Ala Tyr Gln Gln Thr Ala Asp Glu Ile Met Lys Met Ser
            340                 345                 350

Leu Lys Asp Leu Glu Lys Ser Pro Val Tyr Gln Gln His Ile Lys Asp
        355                 360                 365

Gly Met Ser Pro Glu Gln Ala Arg Arg Gln Thr Ala Ser Glu Thr Gly
    370                 375                 380

Leu Thr Ala Ala Ala Ile Gln Leu Pro Ile Ala Ala Ala Thr Gly Pro
385                 390                 395                 400

Leu Val Ser Arg Phe Glu Met Ala Pro Phe Arg Ala Gly Ser Leu Gly
                405                 410                 415

Ala Val Gly Met Asn Leu Ala Arg Glu Thr Val Glu Glu Gly Val Gln
            420                 425                 430

Gly Ala Thr Gly Gln Leu Ala Gln Asn Ile Ala Gln Gln Gln Asn Ile
        435                 440                 445

Asp Lys Asn Gln Asp Leu Leu Lys Gly Val Gly Thr Gln Ala Gly Leu
    450                 455                 460

Gly Ala Leu Tyr Gly Phe Gly Ser Ala Gly Val Val Gln Ala Pro Ala
465                 470                 475                 480

Gly Ala Ala Arg Leu Ala Gly Ala Ala Thr Ala Pro Val Leu Arg Thr
                485                 490                 495

Thr Met Ala Gly Val Lys Ala Ala Gly Ser Val Ala Gly Lys Val Val
            500                 505                 510

Ser Pro Ile Lys Asn Thr Leu Val Ala Arg Gly Glu Arg Val Met Lys
        515                 520                 525

Gln Asn Glu Glu Ala Ser Pro Val Ala Asp Asp Tyr Val Ala Gln Ala
    530                 535                 540

Ala Gln Glu Ala Met Ala Gln Ala Pro Glu Ala Glu Val Thr Ile Arg
545                 550                 555                 560
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Asp Ala Val Glu Ala Thr Asp Ala Thr Pro Glu Gln Lys Val Ala Ala
                565                 570                 575

His Gln Tyr Val Ser Asp Leu Met Asn Ala Thr Arg Phe Asn Pro Glu
            580                 585                 590

Asn Tyr Gln Glu Ala Pro Glu His Ile Arg Asn Ala Val Ala Gly Ser
        595                 600                 605

Thr Asp Gln Val Gln Val Ile Gln Lys Leu Ala Asp Leu Val Asn Thr
    610                 615                 620

Leu Asp Glu Ser Asn Pro Gln Ala Leu Met Glu Ala Ala Ser Tyr Met
625                 630                 635                 640

Tyr Asp Ala Val Ser Glu Phe Glu Gln Phe Ile Asn Arg Asp Pro Ala
                645                 650                 655

Ala Leu Asp Ser Ile Pro Lys Asp Ser Pro Ala Ile Glu Leu Leu Asn
            660                 665                 670

Arg Tyr Thr Asn Leu Thr Ala Asn Ile Gln Asn Thr Pro Lys Val Ile
        675                 680                 685

Gly Ala Leu Asn Val Ile Asn Arg Met Ile Asn Glu Ser Ala Gln Asn
    690                 695                 700

Gly Ser Leu Asn Val Thr Glu Glu Ser Ser Pro Gln Glu Met Gln Asn
705                 710                 715                 720

Val Ala Leu Ala Ala Glu Val Ala Pro Glu Lys Leu Asn Pro Glu Ser
                725                 730                 735

Val Asn Val Val Leu Lys His Ala Ala Asp Gly Arg Ile Lys Leu Asn
            740                 745                 750

Asn Arg Gln Ile Ala Ala Leu Gln Asn Ala Ala Ala Ile Leu Lys Gly
        755                 760                 765

Ala Arg Glu Tyr Asp Ala Glu Ala Ala Arg Leu Gly Leu Arg Pro Gln
    770                 775                 780

Asp Ile Val Ser Lys Gln Ile Lys Thr Asp Glu Ser Arg Thr Gln Glu
785                 790                 795                 800

Gly Gln Tyr Ser Ala Leu Gln His Ala Asn Arg Ile Arg Ser Ala Tyr
                805                 810                 815

Asn Ser Gly Asn Phe Glu Leu Ala Ser Ala Tyr Leu Asn Asp Phe Met
            820                 825                 830

Gln Phe Ala Gln His Met Gln Asn Lys Val Gly Ala Leu Asn Glu His
        835                 840                 845

Leu Val Thr Gly Asn Ala Asp Lys Asn Lys Ser Val His Tyr Gln Ala
    850                 855                 860

Leu Thr Ala Asp Arg Glu Trp Val Arg Ser Arg Thr Gly Leu Gly Val
865                 870                 875                 880

Asn Pro Tyr Asp Thr Lys Ser Val Lys Phe Ala Gln Gln Val Ala Leu
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                885                 890                 895

Glu Ala Lys Thr Val Ala Asp Ile Ala Asn Ala Leu Ala Ser Ala Tyr
            900                 905                 910

Pro Glu Leu Lys Val Ser His Ile Lys Val Thr Pro Leu Asp Ser Arg
        915                 920                 925

Leu Asn Ala Pro Ala Ala Glu Val Val Lys Ala Phe Arg Gln Gly Asn
    930                 935                 940

Arg Asp Val Ala Ser Ser Gln Pro Lys Ala Asp Ser Val Asn Gln Val
945                 950                 955                 960

Lys Glu Thr Pro Val Thr Lys Gln Glu Pro Val Thr Ser Thr Val Gln
                965                 970                 975

Thr Lys Thr Pro Val Ser Glu Ser Val Lys Thr Glu Pro Thr Thr Lys
            980                 985                 990

Glu Ser Ser Pro Gln Ala Ile Lys Glu Pro Val Asn Gln Ser Glu Lys
        995                1000                1005

Gln Asp Val Asn Leu Thr Asn Glu Asp Asn Ile Lys Gln Pro Thr Glu
   1010                1015                1020

Ser Val Lys Glu Thr Glu Thr Ser Thr Lys Glu Ser Thr Val Thr Glu
1025                1030                1035                1040

Glu Leu Lys Glu Gly Ile Asp Ala Val Tyr Pro Ser Leu Val Gly Thr
               1045                1050                1055

Ala Asp Ser Lys Ala Glu Gly Ile Lys Asn Tyr Phe Lys Leu Ser Phe
           1060                1065                1070

Thr Leu Pro Glu Glu Gln Lys Ser Arg Thr Val Gly Ser Glu Ala Pro
       1075                1080                1085

Leu Lys Asp Val Ala Gln Ala Leu Ser Ser Arg Ala Arg Tyr Glu Leu
   1090                1095                1100

Phe Thr Glu Lys Glu Thr Ala Asn Pro Ala Phe Asn Gly Glu Val Ile
1105                1110                1115                1120

Lys Arg Tyr Lys Glu Leu Met Glu His Gly Glu Gly Ile Ala Asp Ile
               1125                1130                1135

Leu Arg Ser Arg Leu Ala Lys Phe Leu Asn Thr Lys Asp Val Gly Lys
           1140                1145                1150

Arg Phe Ala Gln Gly Thr Glu Ala Asn Arg Trp Val Gly Gly Lys Leu
       1155                1160                1165

Leu Asn Ile Val Glu Gln Asp Gly Asp Thr Phe Lys Tyr Asn Glu Gln
   1170                1175                1180

Leu Leu Gln Thr Ala Val Leu Ala Gly Leu Gln Trp Arg Leu Thr Ala
1185                1190                1195                1200

Thr Ser Asn Thr Ala Ile Lys Asp Ala Lys Asp Val Ala Ala Ile Thr
               1205                1210                1215
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Gly Ile Asp Gln Ala Leu Leu Pro Glu Gly Leu Val Glu Gln Phe Asp
          1220                1225                1230

Thr Gly Met Thr Leu Thr Glu Ala Val Ser Ser Leu Ala Gln Lys Ile
       1235                1240                1245

Glu Ser Tyr Trp Gly Leu Ser Arg Asn Pro Asn Ala Pro Leu Gly Tyr
   1250                1255                1260

Thr Lys Gly Ile Pro Thr Ala Met Ala Ala Glu Ile Leu Ala Ala Phe
1265                1270                1275                1280

Val Glu Ser Thr Asp Val Val Glu Asn Ile Val Asp Met Ser Glu Ile
               1285                1290                1295

Asp Pro Asp Asn Lys Lys Thr Ile Gly Leu Tyr Thr Ile Thr Glu Leu
          1300                1305                1310

Asp Ser Phe Asp Pro Ile Asn Ser Phe Pro Thr Ala Ile Glu Glu Ala
       1315                1320                1325

Val Leu Val Asn Pro Thr Glu Lys Met Phe Phe Gly Asp Asp Ile Pro
   1330                1335                1340

Pro Val Ala Asn Thr Gln Leu Arg Asn Pro Ala Val Arg Asn Thr Pro
1345                1350                1355                1360

Glu Gln Lys Ala Ala Leu Lys Ala Glu Gln Ala Thr Glu Phe Tyr Val
               1365                1370                1375

His Thr Pro Met Val Gln Phe Tyr Glu Thr Leu Gly Lys Asp Arg Ile
          1380                1385                1390

Leu Glu Leu Met Gly Ala Gly Thr Leu Asn Lys Glu Leu Leu Asn Asp
       1395                1400                1405

Asn His Ala Lys Ser Leu Glu Gly Lys Asn Arg Ser Val Glu Asp Ser
   1410                1415                1420

Tyr Asn Gln Leu Phe Ser Val Ile Glu Gln Val Arg Ala Gln Ser Glu
1425                1430                1435                1440

Asp Ile Ser Thr Val Pro Ile His Tyr Ala Tyr Asn Met Thr Arg Val
               1445                1450                1455

Gly Arg Met Gln Met Leu Gly Lys Tyr Asn Pro Gln Ser Ala Lys Leu
          1460                1465                1470

Val Arg Glu Ala Ile Leu Pro Thr Lys Ala Thr Leu Asp Leu Ser Asn
       1475                1480                1485

Gln Asn Asn Glu Asp Phe Ser Ala Phe Gln Leu Gly Leu Ala Gln Ala
   1490                1495                1500

Leu Asp Ile Lys Val His Thr Met Thr Arg Glu Val Met Ser Asp Glu
1505                1510                1515                1520

Leu Thr Lys Leu Leu Glu Gly Asn Leu Lys Pro Ala Ile Asp Met Met
               1525                1530                1535
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Val Glu Phe Asn Thr Thr Gly Ser Leu Pro Glu Asn Ala Val Asp Val
          1540                1545                1550

Leu Asn Thr Ala Leu Gly Asp Arg Lys Ser Phe Val Ala Leu Met Ala
       1555                1560                1565

Leu Met Glu Tyr Ser Arg Tyr Leu Val Ala Glu Asp Lys Ser Ala Phe
   1570                1575                1580

Val Thr Pro Leu Tyr Val Glu Ala Asp Gly Val Thr Asn Gly Pro Ile
1585                1590                1595                1600

Asn Ala Met Met Leu Met Thr Gly Gly Leu Phe Thr Pro Asp Trp Ile
               1605                1610                1615

Arg Asn Ile Ala Lys Gly Gly Leu Phe Ile Gly Ser Pro Asn Lys Thr
          1620                1625                1630

Met Asn Glu His Arg Ser Thr Ala Asp Asn Asn Asp Leu Tyr Gln Ala
       1635                1640                1645

Ser Thr Asn Ala Leu Met Glu Ser Leu Gly Lys Leu Arg Ser Asn Tyr
   1650                1655                1660

Ala Ser Asn Met Pro Ile Gln Ser Gln Ile Asp Ser Leu Leu Ser Leu
1665                1670                1675                1680

Met Asp Leu Phe Leu Pro Asp Ile Asn Leu Gly Glu Asn Gly Ala Leu
               1685                1690                1695

Glu Leu Lys Arg Gly Ile Ala Lys Asn Pro Leu Thr Ile Thr Ile Tyr
          1700                1705                1710

Gly Ser Gly Ala Arg Gly Ile Ala Gly Lys Leu Val Ser Ser Val Thr
       1715                1720                1725

Asp Ala Ile Tyr Glu Arg Met Ser Asp Val Leu Lys Ala Arg Ala Lys
   1730                1735                1740

Asp Pro Asn Ile Ser Ala Ala Met Ala Met Phe Gly Lys Gln Ala Ala
1745                1750                1755                1760

Ser Glu Ala His Ala Glu Glu Leu Leu Ala Arg Phe Leu Lys Asp Met
               1765                1770                1775

Glu Thr Leu Thr Ser Thr Val Pro Val Lys Arg Lys Gly Val Leu Glu
          1780                1785                1790

Leu Gln Ser Thr Gly Thr Gly Ala Lys Gly Lys Ile Asn Pro Lys Thr
       1795                1800                1805

Tyr Thr Ile Lys Gly Glu Gln Leu Lys Ala Leu Gln Glu Asn Met Leu
   1810                1815                1820

His Phe Phe Val Glu Pro Leu Arg Asn Gly Ile Thr Gln Thr Val Gly
1825                1830                1835                1840

Glu Ser Leu Val Tyr Ser Thr Glu Gln Leu Gln Lys Ala Thr Gln Ile
               1845                1850                1855

Gln Ser Val Val Leu Glu Asp Met Phe Lys Gln Arg Val Gln Glu Lys
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          1860                1865                1870

Leu Ala Glu Lys Ala Lys Asp Pro Thr Trp Lys Lys Gly Asp Phe Leu
       1875                1880                1885

Thr Gln Lys Glu Leu Asn Asp Ile Gln Ala Ser Leu Asn Asn Leu Ala
   1890                1895                1900

Pro Met Ile Glu Thr Gly Ser Gln Thr Phe Tyr Ile Ala Gly Ser Glu
1905                1910                1915                1920

Asn Ala Glu Val Ala Asn Gln Val Leu Ala Thr Asn Leu Asp Asp Arg
               1925                1930                1935

Met Arg Val Pro Met Ser Ile Tyr Ala Pro Ala Gln Ala Gly Val Ala
           1940                1945                1950

Gly Ile Pro Phe Met Thr Ile Gly Thr Gly Asp Gly Met Met Met Gln
       1955                1960                1965

Thr Leu Ser Thr Met Lys Gly Ala Pro Lys Asn Thr Leu Lys Ile Phe
   1970                1975                1980

Asp Gly Met Asn Ile Gly Leu Asn Asp Ile Thr Asp Ala Ser Arg Lys
1985                1990                1995                2000

Ala Asn Glu Ala Val Tyr Thr Ser Trp Gln Gly Asn Pro Ile Lys Asn
               2005                2010                2015

Val Tyr Glu Ser Tyr Ala Lys Phe Met Lys Asn Val Asp Phe Ser Lys
           2020                2025                2030

Leu Ser Pro Glu Ala Leu Glu Ala Ile Gly Lys Ser Ala Leu Glu Tyr
       2035                2040                2045

Asp Gln Arg Glu Asn Ala Thr Val Asp Asp Ile Ala Asn Ala Ala Ser
   2050                2055                2060

Leu Ile Glu Arg Asn Leu Arg Asn Ile Ala Leu Gly Val Asp Ile Arg
2065                2070                2075                2080

His Lys Val Leu Asp Lys Val Asn Leu Ser Ile Asp Gln Met Ala Ala
               2085                2090                2095

Val Gly Ala Pro Tyr Gln Asn Asn Gly Lys Ile Asp Leu Ser Asn Met
           2100                2105                2110

Thr Pro Glu Gln Gln Ala Asp Glu Leu Asn Lys Leu Phe Arg Glu Glu
       2115                2120                2125

Leu Glu Ala Arg Lys Gln Lys Val Ala Lys Ala Arg Ala Glu Val Lys
   2130                2135                2140

Glu Glu Thr Val Ser Glu Lys Glu Pro Val Asn Pro Asp Phe Gly Met
2145                2150                2155                2160

Val Gly Arg Glu His Lys Ala Ser Gly Val Arg Ile Leu Ser Ala Thr
               2165                2170                2175

Ala Ile Arg Asn Leu Ala Lys Ile Ser Asn Leu Pro Ser Thr Gln Ala
           2180                2185                2190
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Ala Thr Leu Ala Glu Ile Gln Lys Ser Leu Ala Ala Lys Asp Tyr Lys
2195 2200 2205

Ile Ile Tyr Gly Thr Pro Thr Gln Val Ala Glu Tyr Ala Arg Gln Lys
2210 2215 2220

Asn Val Thr Glu Leu Thr Ser Gln Glu Met Glu Glu Ala Gln Ala Gly
2225 2230 2235 2240

Asn Ile Tyr Gly Trp Thr Asn Phe Asp Asp Lys Thr Ile Tyr Leu Val
2245 2250 2255

Ser Pro Ser Met Glu Thr Leu Ile His Glu Leu Val His Ala Ser Thr
2260 2265 2270

Phe Glu Glu Val Tyr Ser Phe Tyr Gln Gly Asn Glu Val Ser Pro Thr
2275 2280 2285

Ser Lys Gln Ala Ile Glu Asn Leu Glu Gly Leu Met Glu Gln Phe Arg
2290 2295 2300

Ser Leu Asp Ile Ser Lys Asp Ser Pro Glu Met Arg Glu Ala Tyr Ala
2305 2310 2315 2320

Asp Ala Ile Ala Thr Ile Glu Gly His Leu Ser Asn Gly Phe Val Asp
2325 2330 2335

Pro Ala Ile Ser Lys Ala Ala Ala Leu Asn Glu Phe Met Ala Trp Gly
2340 2345 2350

Leu Ala Asn Arg Ala Leu Ala Ala Lys Gln Lys Arg Thr Ser Ser Leu
2355 2360 2365

Val Gln Met Val Lys Asp Val Tyr Gln Ala Ile Lys Lys Leu Ile Trp
2370 2375 2380

Gly Arg Lys Gln Ala Pro Ala Leu Gly Glu Asp Met Phe Ser Asn Leu
2385 2390 2395 2400

Leu Phe Asn Ser Ala Ile Leu Met Arg Ser Gln Pro Thr Thr Gln Ala
2405 2410 2415

Val Ala Lys Asp Gly Thr Leu Phe His Ser Lys Ala Tyr Gly Asn Asn
2420 2425 2430

Glu Arg Leu Ser Gln Leu Asn Gln Thr Phe Asp Lys Leu Val Thr Asp
2435 2440 2445

Tyr Leu Arg Thr Asp Pro Val Thr Glu Val Glu Arg Arg Gly Asn Val
2450 2455 2460

Ala Asn Ala Leu Met Ser Ala Thr Arg Leu Val Arg Asp Val Gln Ser
2465 2470 2475 2480

His Gly Phe Asn Met Thr Ala Gln Glu Gln Ser Val Phe Gln Met Val
2485 2490 2495

Thr Ala Ala Leu Ala Thr Glu Ala Ala Ile Asp Pro His Ala Met Ala
2500 2505 2510

Arg Ala Gln Glu Leu Tyr Thr His Val Met Lys His Leu Thr Val Glu
2515 2520 2525

His Phe Met Ala Asp Pro Asp Ser Thr Asn Pro Ala Asp Arg Tyr Tyr
2530 2535 2540

Ala Gln Gln Lys Tyr Asp Thr Ile Ser Gly Ala Asn Leu Val Glu Val
2545 2550 2555 2560

Asp Ala Lys Gly Arg Thr Ser Leu Leu Pro Thr Phe Leu Gly Leu Ala
2565 2570 2575

Met Val Asn Glu Glu Leu Arg Ser Ile Ile Lys Glu Met Pro Val Pro
2580 2585 2590

Lys Ala Asp Lys Lys Leu Gly Asn Asp Ile Asp Thr Leu Leu Thr Asn
2595 2600 2605

Ala Gly Thr Gln Val Met Glu Ser Leu Asn Arg Arg Met Ala Gly Asp
2610 2615 2620

Gln Lys Ala Thr Asn Val Gln Asp Ser Ile Asp Ala Leu Ser Glu Thr
2625 2630 2635 2640

Ile Met Ala Ala Ala Leu Lys Arg Glu Ser Phe Tyr Asp Ala Val Ala
2645 2650 2655

Thr Pro Thr Gly Asn Phe Ile Asp Arg Ala Asn Gln Tyr Val Thr Asp
2660 2665 2670

Ser Ile Glu Arg Leu Ser Glu Thr Val Ile Glu Lys Ala Asp Lys Val
2675 2680 2685

Ile Ala Asn Pro Ser Asn Ile Ala Ala Lys Gly Val Ala His Leu Ala
2690 2695 2700

Lys Leu Thr Ala Ala Ile Ala Ser Glu Lys Gln Gly Glu Ile Val Ala
2705 2710 2715 2720

Gln Gly Val Met Thr Ala Met Asn Gln Gly Lys Val Trp Gln Pro Phe
2725 2730 2735

His Asp Leu Val Asn Asp Ile Val Gly Arg Thr Lys Thr Asn Ala Asn
2740 2745 2750

Val Tyr Asp Leu Ile Lys Leu Val Lys Ser Gln Ile Ser Gln Asp Arg
2755 2760 2765

Gln Gln Phe Arg Glu His Leu Pro Thr Val Ile Ala Gly Lys Phe Ser
2770 2775 2780

Arg Lys Leu Thr Asp Thr Glu Trp Ser Ala Met His Thr Gly Leu Gly
2785 2790 2795 2800

Lys Thr Asp Leu Ala Val Leu Arg Glu Thr Met Ser Met Ala Glu Ile
2805 2810 2815

Arg Asp Leu Leu Ser Ser Ser Lys Lys Val Lys Asp Glu Ile Ser Thr
2820 2825 2830

Leu Glu Lys Glu Ile Gln Asn Gln Ala Gly Arg Asn Trp Asn Leu Val

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       2835                2840                2845

Gln Lys Lys Ser Lys Gln Leu Ala Gln Tyr Met Ile Met Gly Glu Val
   2850                2855                2860

Gly Asn Asn Leu Leu Arg Asn Ala His Ala Ile Ser Arg Leu Leu Gly
2865                2870                2875                2880

Glu Arg Ile Thr Asn Gly Pro Val Ala Asp Val Ala Ala Ile Asp Lys
               2885                2890                2895

Leu Ile Thr Leu Tyr Ser Leu Glu Leu Met Asn Lys Ser Asp Arg Asp
           2900                2905                2910

Leu Leu Ser Glu Leu Ala Gln Ser Glu Val Glu Gly Met Glu Phe Ser
       2915                2920                2925

Ile Ala Tyr Met Val Gly Gln Arg Thr Glu Glu Met Arg Lys Ala Lys
   2930                2935                2940

Gly Asp Asn Arg Thr Leu Leu Asn His Phe Lys Gly Tyr Ile Pro Val
2945                2950                2955                2960

Glu Asn Gln Gln Gly Val Asn Leu Ile Ile Ala Asp Asp Lys Glu Phe
               2965                2970                2975

Ala Lys Leu Asn Ser Gln Ser Phe Thr Arg Ile Gly Thr Tyr Gln Gly
           2980                2985                2990

Ser Thr Gly Phe Arg Thr Gly Ser Lys Gly Tyr Tyr Phe Ser Pro Val
       2995                3000                3005

Ala Ala Arg Ala Pro Tyr Ser Gln Gly Ile Leu Gln Asn Val Arg Asn
   3010                3015                3020

Thr Ala Gly Gly Val Asp Ile Gly Thr Gly Phe Thr Leu Gly Thr Met
3025                3030                3035                3040

Val Ala Gly Arg Ile Thr Asp Lys Pro Thr Val Glu Arg Ile Thr Lys
               3045                3050                3055

Ala Leu Ala Lys Gly Glu Arg Gly Arg Glu Pro Leu Met Pro Ile Tyr
           3060                3065                3070

Asn Ser Lys Gly Gln Val Val Ala Tyr Glu Gln Ser Val Asp Pro Asn
       3075                3080                3085

Met Leu Lys His Leu Asn Gln Asp Asn His Phe Ala Lys Met Val Gly
   3090                3095                3100

Val Trp Arg Gly Arg Gln Val Glu Glu Ala Lys Ala Gln Arg Phe Asn
3105                3110                3115                3120

Asp Ile Leu Ile Glu Gln Leu His Ala Met Tyr Glu Lys Asp Ile Lys
               3125                3130                3135

Asp Ser Ser Ala Asn Lys Ser Gln Tyr Val Asn Leu Leu Gly Lys Ile
           3140                3145                3150

Asp Asp Pro Val Leu Ala Asp Ala Ile Asn Leu Met Asn Ile Glu Thr
       3155                3160                3165
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Arg His Lys Ala Glu Glu Leu Phe Gly Lys Asp Glu Leu Trp Val Arg
   3170                3175                3180

Arg Asp Met Leu Asn Asp Ala Leu Gly Tyr Arg Ala Ala Ser Ile Gly
3185                3190                3195                3200

Asp Val Trp Thr Gly Asn Ser Arg Trp Ser Pro Ser Thr Leu Asp Thr
               3205                3210                3215

Val Lys Lys Met Phe Leu Gly Ala Phe Gly Asn Lys Ala Tyr His Val
           3220                3225                3230

Val Met Asn Ala Glu Asn Thr Ile Gln Asn Leu Val Lys Asp Ala Lys
       3235                3240                3245

Thr Val Ile Val Val Lys Ser Val Val Val Pro Ala Val Asn Phe Leu
   3250                3255                3260

Ala Asn Ile Tyr Gln Met Ile Gly Arg Gly Val Pro Val Lys Asp Ile
3265                3270                3275                3280

Ala Val Asn Ile Pro Arg Lys Thr Ser Glu Ile Asn Gln Tyr Ile Lys
               3285                3290                3295

Ser Arg Leu Arg Gln Ile Asp Ala Glu Ala Glu Leu Arg Ala Ala Glu
           3300                3305                3310

Gly Asn Pro Asn Leu Val Arg Lys Leu Lys Thr Glu Ile Gln Ser Ile
       3315                3320                3325

Thr Asp Ser His Arg Arg Met Ser Ile Trp Pro Leu Ile Glu Ala Gly
   3330                3335                3340

Glu Phe Ser Ser Ile Ala Asp Ala Gly Ile Ser Arg Asp Asp Leu Leu
3345                3350                3355                3360

Val Ala Glu Gly Lys Ile His Glu Tyr Met Glu Lys Leu Ala Asn Lys
               3365                3370                3375

Leu Pro Glu Lys Val Arg Asn Ala Gly Arg Tyr Ala Leu Ile Ala Lys
           3380                3385                3390

Asp Thr Ala Leu Phe Gln Gly Ile Gln Lys Thr Val Glu Tyr Ser Asp
       3395                3400                3405

Phe Ile Ala Lys Ala Ile Ile Tyr Asp Asp Leu Val Lys Arg Lys Lys
   3410                3415                3420

Lys Ser Ser Ser Glu Ala Leu Gly Gln Val Thr Glu Glu Phe Ile Asn
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Tyr Asp Arg Leu Pro Gly Arg Phe Arg Gly Tyr Met Glu Ser Met Gly
               3445                3450                3455

Leu Met Trp Phe Tyr Asn Phe Lys Ile Arg Ser Ile Lys Val Ala Met
           3460                3465                3470

Ser Met Ile Arg Asn Asn Pro Val His Ser Leu Ile Ala Thr Val Val
       3475                3480                3485
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Pro Ala Pro Thr Met Phe Gly Asn Val Gly Leu Pro Ile Gln Asp Asn
3490 3495 3500

Met Leu Thr Met Leu Ala Glu Gly Arg Leu Asp Tyr Ser Leu Gly Phe
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Gly Gln Gly Leu Arg Ala Pro Thr Leu Asn Pro Trp Phe Asn Leu Thr
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His

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